

WHAT IS CLAIMED IS:

1. A substantially pure O-fucosyltransferase enzyme which is capable of glycosylating an EGF domain of a polypeptide with an activated O-fucose moiety.
2. The enzyme of claim 1 wherein the polypeptide glycosylated has the sequence -Cys-Xaa-Xaa-Xaa-Xaa-Ser/Thr-Cys-.
3. The enzyme of claim 2 wherein the polypeptide glycosylated had the sequence -Cys-Xaa-Xaa-Gly-Gly-Ser/Thr-Cys-.
4. The enzyme of claim 1 which has the following sequence:  
MPAGSWDPAGYLLYCPCMGRFGNQADHFLGSLAF AKLLNRTLAVPPWIEYQHHKPPFTNLH  
[SEQ ID NO:9].
5. The enzyme of claim 1 which has the following sequence:  
RLAGSWDLAGYLLYXPXMGRFGNQADHFLGSLAF AKLXVRTLAVPPWIEYQHHKPPFTNLH  
[SEQ ID NO:3].
6. A substantially pure functional fragment or analog of an O-fucosyltransferase substantially identical to the sequence:  
MPAGSWDPAGYLLYCPCMGRFGNQADHFLGSLAF AKLLNRTLAVPPWIEYQHHKPPFTNLH  
[SEQ ID NO:9].  
that is capable of glycosylating an EGF domain of a polypeptide with an activated O-fucose moiety.
7. The fragment or analog of claim 6 wherein the polypeptide glycosylated has the sequence -Cys-Xaa-Xaa-Xaa-Xaa-Ser/Thr-Cys-.
8. The fragment or analog of claim 6 wherein the polypeptide glycosylated had the sequence -Cys-Xaa-Xaa-Gly-Gly-Ser/Thr-Cys-.
9. A substantially pure DNA sequence substantially identical to the first 1100 nucleotides of Fig. 12A [Seq. ID No. 16] which encodes a protein is capable of glycosylating the EGF domain of a polypeptide.

10. The DNA of claim 9 wherein the encoded protein is capable of glycosylating the sequence -Cys-Xaa-Xaa-Xaa-Xaa-Ser/Thr-Cys-.
11. The DNA of claim 9 wherein the encoded protein is capable of glycosylating the sequence -Cys-Xaa-Xaa-Gly-Gly-Ser/Thr-Cys-.
12. An O-fucosyltransferase variant which inhibits natural O-fucosyltransferase activity.
13. The variant of claim 12 which inhibits fucosylation of the sequence -Cys-Xaa-Xaa-Xaa-Xaa-Ser/Thr-Cys-.
14. The variant of claim 12 which inhibits fucosylation of the sequence -Cys-Xaa-Xaa-Gly-Gly-Ser/Thr-Cys-.
15. An antibody which is capable of binding O-fucosyltransferase.
16. The antibody of claim 15 which is capable of binding O-fucosyltransferase of the sequence:  
MPAGSWDPAGYLLYCPCMGRFGNQADHFLGSLAFKLLNRTLAVPPWIEYQHHKPPFTNLH  
[SEQ ID NO:9].
17. The antibody of claim 15 which is polyclonal.
18. The antibody of claim 15 which is monoclonal.
19. The antibody of claim 15 which is humanized.
20. The antibody of claim 15 which is bispecific.
21. The antibody of claim 15 which is heterospecific.
22. A method of glycosylating a EGF domain of a polypeptide with an activated O-fucose moiety comprising the application of an O-fucosyltransferase.
23. The method of claim 22 wherein the glycosylated polypeptide comprises the sequence -Cys-Xaa-Xaa-Xaa-Xaa-Ser/Thr-Cys-.

[illegible]

25. A process for isolating and purifying O-fucosyltransferase comprising:
- a) preparing an extract from a cell line expressing O-fucosyltransferase,
  - b) purifying via a first chromatography step over sequentially applied anion exchange resin and nucleotide binding resin;
  - c) purifying via a second chromatography step over an acceptor substrate ligand associated with a metal chelating-agarose resin;
  - d) purifying via a third chromatography purification over a donor substrate analog ligand associated with agarose.
26. The process of claim 25 wherein the anion exchange resin is DE-52.
27. The process of claim 25 wherein the nucleotide binding resin is Cibacron Blue 3GA.
28. The process of claim 25 wherein the donor substrate analog is GDP-hexanolamine.
29. The process of claim 25 wherein the metal chelating resin is an IMAC resin.
30. The process of claim 25 wherein the metal chelating resin is  $\text{Ni}^{2+}$ -NTA.